

AMENDMENTS TO THE CLAIMS

Claims 1-22 were originally filed in the Application on July 18, 2003. Claims 5 and 16 were cancelled in an amendment filed April 4, 2005 in response to an Office action mailed November 3, 2004. Claims 1-4 and 6-8 were allowed, and claims 9-15 and 17-22 stand rejected in an Office action mailed August 26, 2005. New claim 23 is added in this response. Claims 1, 9, 12, 20 and 23 are independent claims. Claims 2-4 and 6-8, 10-11, 13-15 and 17-19, and 21-22 depend either directly or indirectly from independent claims 1, 9, 12, and 20, respectively.

Listing of Claims:

Claim 1. (Previously presented) A combined sidetone and hybrid balance apparatus comprising:

at least one filter, the at least one filter having an input and an output, wherein the at least one filter uses a first predetermined set of filter coefficients in a first mode of operation, and a second predetermined set of filter coefficients in a second mode of operation;

a combiner having at least a first input and a second input, the second input coupled to the output of the at least one filter, the combiner for combining the at least a first input and a second input to produce an output;

a first switch coupling a first input signal to the first input of the combiner in the first mode of operation, and coupling a second input signal to the first input of the combiner in the second mode of operation;

a second switch coupling the output of the combiner to a first output in the first mode of operation, and coupling the input of the at least one filter to the first output in the second mode of operation;

a third switch coupling the second input signal to the input of the at least one filter in the first mode of operation, and coupling the first input signal to the input of the at least one filter in the second mode of operation; and

a fourth switch coupling the input of the at least one filter to a second output in the first mode of operation, and coupling the output of the combiner to the second output in the second mode of operation.

Claim 2. (Original) The combined sidetone and hybrid balance apparatus of claim 1 wherein the at least one filter is a digital filter.

Claim 3. (Previously presented) The combined sidetone and hybrid balance apparatus of claim 1 wherein the at least one filter is a finite impulse response (FIR) filter.

Claim 4. (Previously presented) The combined sidetone and hybrid balance apparatus of claim 3 wherein the at least one filter is a finite impulse response (FIR) filter with three taps.

Claim 5. (Cancelled)

Claim 6. (Previously presented) The combined sidetone and hybrid balance apparatus of claim 1 wherein the first mode of operation is a hybrid balance mode and the second mode of operation is a sidetone mode.

Claim 7. (Original) The combined sidetone and hybrid balance apparatus of claim 1 wherein the combining comprises one of at least adding the first input to the second input, adding the first input to the negative of the second input, and subtracting the second input from the first input.

Claim 8. (Original) The combined sidetone and hybrid balance apparatus of claim 1 wherein the functionality is contained within a single integrated circuit device.

Claim 9. (Currently Amended) A combined sidetone and hybrid balance apparatus comprising:

a first signal path carrying a first signal;
a second signal path carrying a second signal;
a mode input signal taking one of having at least a first state and a second state;
a single reconfigurable non-adaptive filter for modifying at least one of the following: the first signal and the second signal; and
wherein the apparatus generates a sidetone signal in the first signal by combining at least a portion of the second signal with the first signal when the mode input signal is in the first state, and cancels an echo in the second signal by subtracting at least a portion of the first signal from the second signal when the mode input signal is in the second state.

Claim 10. (Original) The apparatus of claim 9 wherein the signals in the first signal path and the second signal path are digital signals.

Claim 11. (Original) The apparatus of claim 9 wherein the apparatus is contained within a single integrated circuit.

Claim 12. (Currently Amended) A method of operating a combined sidetone and hybrid balance apparatus for processing first and second input signals, the method comprising:

before signal processing,

determining one of a first mode and a second mode of operation,

establishing a first fixed set of filter coefficients if operating in the first mode, and

establishing a second fixed set of filter coefficients if operating in the second mode;

receiving a first input signal;

receiving a second input signal;

when in [[a]] the first mode of operation,

filtering the second input signal using [[a]] the first predetermined fixed set of filter coefficients;

combining the first input signal and the filtered second input signal to produce a combined signal;

transmitting the combined signal on a first output; and

transmitting the second input signal on a second output, and

when in the [[a]] second mode of operation,

filtering the first input signal using [[a]] the second predetermined fixed set of filter coefficients;

transmitting the first input signal on the first output;

combining the second input signal and the filtered first input signal to produce a combined signal; and

transmitting the combined signal on the second output.

Claim 13. (Original) The method of claim 12 wherein the filtering uses a digital filter.

Claim 14. (Original) The method of claim 12 wherein the filtering uses a finite impulse response filter.

Claim 15. (Previously presented) The method of claim 14 wherein the filtering uses a finite impulse response filter with three taps.

Claim 16. (Cancelled)

Claim 17. (Previously presented) The method of claim 12 wherein the first predetermined set of filter coefficients and the second predetermined set of filter coefficients are different.

Claim 18. (Original) The method of claim 12 wherein the combining comprises one of at least adding the first input to the second input, adding the first input to the negative of the second input, and subtracting the second input from the first input.

Claim 19. (Original) The method of claim 12 wherein the receiving, filtering, combining, and transmitting are performed within a single integrated circuit device.

Claim 20. (Currently Amended) A method of operating a combined sidetone and hybrid balance apparatus having a first signal path and a second signal path, the method comprising:

receiving a control signal ~~having at least~~ taking one of a first state and a second state;

configuring routing of signals in the first and second paths in an electrical circuit to perform non-adaptive filtering and combining, based upon the control signal;

generating a sidetone signal in the first signal path by adding at least a portion of the signal from the second signal path to the signal in the first signal path if the control signal is in the first state; and

cancelling an echo signal in the second signal path by subtracting from the signal in the second signal path a modified version of the signal in the first signal path if the control signal is in the second state.

Claim 21. (Original) The method of claim 20 wherein the signals traversing the first signal path and the second signal path are digital signals.

Claim 22. (Original) The method of claim 20 wherein the method is performed within a single integrated circuit device.

Claim 23. (New) A voice communication device comprising:

four wire to two wire hybrid circuitry for coupling a transmit speech signal to a two-wire telephone line of a conventional switched telephone network, and for coupling from the two-wire telephone line a receive speech signal;

a hybrid balance circuit comprising a non-adaptive, short tail echo canceller circuit accepting as input the transmit and receive speech signals, and producing as output the receive speech signal essentially free of echo of the transmit speech signal generated by the hybrid circuitry; and

an adaptive echo canceller accepting the output of the hybrid balance circuit, the adaptive echo canceller removing remaining echo from the receive signal to produce a substantially echo free receive speech signal.